

# MITHUN NAG KARADI GIRIDHAR

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## Personal Statement

My scientific motivation is driven by a desire to understand how biological function emerges from molecular rules and to translate that understanding into practical tools. Trained across biology, engineering, and mathematics, I have developed strong expertise in both experimental and computational approaches, allowing me to integrate wet-lab experiments with molecular modeling and data analysis. I am a hands-on and highly collaborative scientist who independently drives projects while working effectively across disciplines and mentoring others. My research examines proteins through an evolutionary framework to uncover less well-understood high-energy intermediate states that shape folding, stability, and function, and to apply these thermodynamic insights toward therapeutic and translational development. I have rigorously trained to organize complex data, extract meaningful insights, and disseminate scientific findings through well-crafted narratives and illustrations that drive clear, compelling, and data-driven conclusions.

- Website: [www.mithunnag.com](http://www.mithunnag.com)
- Github: <https://github.com/Mithun-Nag>

## Skills

- In-vitro Protein folding
- Molecular modeling & Simulation
- Protein NMR
- X-ray Crystallography
- Mass Spectrometry (MALDI-TOF, LCMS)
- Cell based and in-vitro ligand assays
- Manuscript preparation
- Excellent communicator with animations
- Team player
- Driven towards interdisciplinary science
- Mathematical thinking and modelling

## Experience

### Biochemistry Postdoctoral Researcher and Student Association (BPSA) Postdoc Liaison

01/2024 to 01/2025

#### Vanderbilt University

### Academic Co-Chair at Vanderbilt Postdoc Association (VPA)

03/2024 to 03/2025

#### Vanderbilt University

- Lead the 18th annual symposium team <https://www.vanderbilt.edu/postdoc/about-vpa/vpa-symposium/> while playing a lead role in inviting and co-ordinating with the keynote speakers for the 18th and 19th VPA symposium.

### Postdoctoral Fellow

08/2023 to 09/2025

#### Vanderbilt University

Nashville Tennessee

- Department of Biochemistry, Vanderbilt University, Nashville, Tennessee. (Advisor: Associate Prof. Douglas Kojetin)

### Research Assistant & Graduate Student

01/2020 to 05/2023

#### University of Texas at Arlington

- (Advisor: Prof. Allan Clay Clark)

### Teaching Assistant & Graduate Student, Department of Biology

05/2018 to 01/2020

#### University of Texas at Arlington

- (Advisor: Prof. Allan Clay Clark)

### Lab Engineer

03/2018 to 08/2018

#### Harvard University SEAS

- Served as a lab assistant for an environmental engineering course. Designed programs and delivered lectures for UTEC, UNSIT, BioSTAR, and International Water Engineering summer courses. Developed skills in microfluidics, 3D printing, HPLC, electron microscopy, confocal microscopy, mammalian cell culture, and chemical kinetics. (Advisors- Dr. Anas Chalah & Dr. Melisa Hancock)

## Laboratory Assistant

05/2015 to 09/2015

### Everest Biotech

- Conducted research on the chemical modification of chitosan and analyzed its biotechnological potential. Purifying kokum butter to export-quality standards on a small scale for utilization as an ointment base.

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## Education

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<b>Ph.D.: Quantitative Biology</b>	<b>05/2023</b>
University of Texas at Arlington	Arlington, TX
<b>M.S.: Bioengineering</b>	<b>12/2017</b>
University of Texas at Arlington	Arlington, TX
<b>B.E.: Biotechnology</b>	<b>05/2015</b>
BMS College of Engineering	Bangalore, Karnataka, India

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## Awards

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XSEDE startup, NSF fund, FASEB conference 2022 travel award for conference in Dublin, Ireland.

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## Societies

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- Phi sigma member at UTA, 2017-2018.
- Guitarist at UTA Indian organizations- ISI and FSI society, 2016-2018.
- Guitarist at IMS society at UTA 2018-2023. Beyond scientific research, I bring unique interests, expertise, and experiences that will contribute to the vibrant social networking opportunities helping to build strong networks and foster collaboration across diverse areas of research. As an avid guitarist and music creator, I recognize the power of art and culture in fostering connections and communication.

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## Conference Presentations

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- Poster Presentation: 28th Texas Protein Folding and Function Meeting, 2019. GIBBS society of biological thermodynamics, 2019, 2021, 2022, 2023. EBSA conference Austria 2020 virtual meeting. FASEB conference 2021 (Dublin, Ireland). Biophysical conference 2022. ASBMB conference 2022 & 2023.
- Co-organizer: Saturday night thermo for GIBBS35 meeting in 2021.
- Conference presentations - GIBBS society, 2019, 2022, 2024, FASEB conference 2021 (Dublin, Ireland) and 2022 Southeast Biophysical Consortium (Texas Woman's University, Denton, TX).

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## Animations

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I have a strong interest in creating animations that utilize MD trajectories, Adobe Illustrator Animate, and Premier Pro to transform static models into dynamic visual representations. These animations serve to communicate experimental insights to a broader audience effectively. Moving forward, I am committed to producing animations that inform the findings, thereby disseminating our findings to a wider audience.

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## Reviewer

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I have served as a peer reviewer for five manuscripts for Biophysical Journal and the Computational and Structural Biotechnology Journal, with verified reviewer activity on Web of Science and ORCID ID 0000-0003-0520-5921.

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## Publications

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- Nag, M. & Clark, A. C. Conserved folding landscape of monomeric initiator caspases. *Journal of Biological Chemistry* (2023).  
<https://doi.org/10.1016/j.jbc.2023.103075>
- Bibo-Verdugo, B., Joglekar, I., Nag, M., Ramirez, M. L., Snipas, S. J., Clark, A. C., Poreba, M., & Salvesen, G. S. Resurrection of an ancient inflammatory locus reveals switch to caspase-1 specificity on a caspase-4 scaffold. *Journal of Biological Chemistry* (2022), **298**, 101931.  
<https://doi.org/10.1016/j.jbc.2022.101931>
- Joglekar, I., Nag, M., Diaz, D. A., Deo, A., & Clark, A. C. Evolution of the conformational ensemble and allosteric networks of apoptotic caspases in chordates. *Biochemical Journal* (2025), **482**(15), 1029–1046.  
<https://doi.org/10.1042/BCJ20250001>
- Zorc, S. A., Munoz-Tello, P., O'Leary, T., Yu, X., Nag, M., Hondros, A. D., Hansel-Harris, A., Forli, S., Griffin, P. R., Kojetin, D. J., Roy, R. N., & Janiszewska, M. Structural insights into IMP2 dimerization and RNA binding. *Journal of Structural Biology* (2025).  
<https://www.sciencedirect.com/science/article/pii/S1047847725000826>
- Laughlin, Z. T., Arifova, L., Munoz-Tello, P., Yu, X., Nag, M., Dong, J., Harp, J. M., Zhu, D., Kamenecka, T. M., & Kojetin, D. J. Structural basis of PPAR $\gamma$ -mediated transcriptional repression by the covalent inverse agonist FX-909. *Journal of Medicinal Chemistry* (2025).  
<https://pubs.acs.org/doi/full/10.1021/acs.jmedchem.5c01252>
- Arifova, L., MacTavish, B. S., Laughlin, Z. T., Nag, M., Shang, J., Li, M.-H., Yu, X., Zhu, D., Kamenecka, T. M., & Kojetin, D. J. Shifting the PPAR $\gamma$  conformational ensemble towards a transcriptionally repressive state improves covalent inhibitor efficacy. *bioRxiv* (2025).  
<https://doi.org/10.1101/2025.03.04.640448>
- Nag, M. PUFAs bind high-energy intermediate in the Nurr1 LBD ensemble and reveal allosteric hubs that govern global dynamics. *Manuscript in preparation*.
- Nag, M. An intrinsic intermediate state gates ligand-dependent PPAR $\gamma$  activation and repression *Manuscript in preparation*.